SIEMENS

ACOM.Report® VA01A

[redacted] AX

DICOM Conformance Statement

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1. Introduction

1.1 Overview

The Conformance Statement describes the DICOM interface for the Siemens ACOM.Report® VA01A application in terms of part 2 of [DICOM].

This introduction describes the application's implemented DICOM functionality in general terms.

1.2 Scope and Field

The Siemens product ACOM.Report® is an application to convert report files from the Siemens CathCor® or QuantCor® products into the DICOM format. Now the reports can be archived on a DICOM CD and can be viewed from there with any DICOM viewer.
The ACOM.Report® supports the storage of images utilizing the DICOM XA IOD.

1.3 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

1.4 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.

Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.

The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

1.5 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations are as follows

AE	DICOM Application Entity
FSE	Field Service Engineer
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
IOD	DICOM Information Object Definition
PDU	DICOM Protocol Data Unit

1.6 References

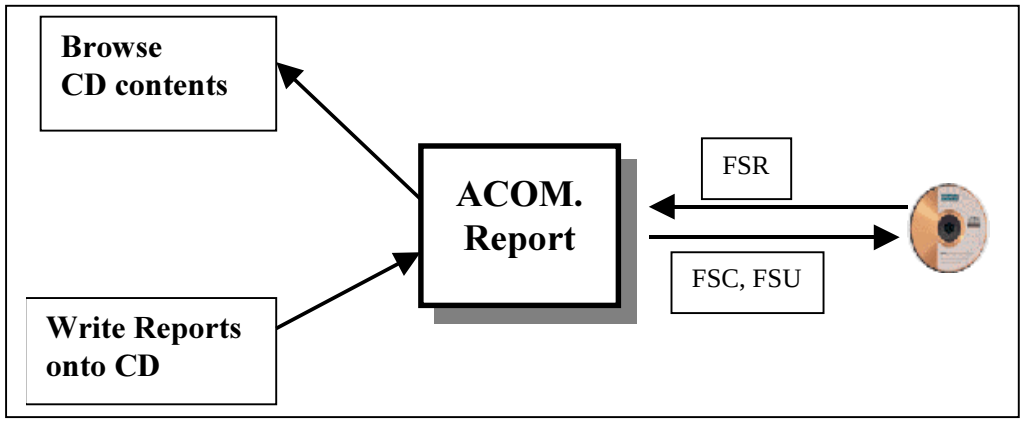
[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.13, 1998

2. Media Storage

The ACOM.Report® DICOM off-line media storage service implementation acts as FSC, FSU and FSR for the specified application profiles and the related SOP Class instances.

2.1 Implementation Model

2.1.1 Application Data Flow Diagram



The ACOM.Report® application will serve as an interface to the CD-R off-line medium device. It can load the off-line media directory into the browser and write SOP instances to a medium.

2.1.2 Functional Definition of AE

The ACOM.Report® product DICOM off-line media storage application consists all interfaces to access off-line media. It is capable of

- creating a new File-set onto an unwritten CD-R medium.
- updating an existing File-set by writing new SOP Instances onto the medium.
- reading the File-sets DICOMDIR information temporarily into the browser.

2.1.3 Sequencing of Real World Activities

The ACOM.Report® application will not perform updates before the Directory information of the DICOMDIR is completely read.

2.1.4 File Meta Information Options

Implementation Class UID	“1.3.12.2.1107.5.4.8”
Implementation Version Name	“Siemens_ARep_10"

2.2 AE Specification

2.2.1 DICOM Archive Specification

The ACOM.Report® Application provides Standard conformance to Media Storage Service Class (Interchange Option).

Application profiles, Activities, and Roles for DICOM Archive

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD AUG-XABC-CD AUG-XA1K-CD	Browse Directory Information	FSR	Interchange
	Export to local archive media	FSC,FSU	Interchange

The ACOM.Report® Application can update all three standard Application profiles STD-GEN-CD, STD-XABC-CD (thus creating an AUG-XABC-CD media) and STD-XA1K-CD (thus creating an AUG-XA1K-CD media). When creating a fileset on an empty media (FSC role) then the AUG-XA1K-CD Application Profile will be used.

2.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is set by configuration.

2.2.1.2 Real-World Activities for this Application Entity

2.2.1.2.1 Real-World Activity: Browse Directory Information

The ACOM.Report® application acts as FSR and reads the DICOMDIR file as soon as a DICOM CD is inserted into the drive. The DICOMDIR contents are evaluated and the Patients listed in the Patient Browser. When a Patient entry is selected in this Patient Browser then the corresponding information about the studies on CD is displayed in the Study Browser.

2.2.1.2.2 Real-World Activity: Export to local Archive Media

The ACOM.Report® application acts as an FSU (for media with existing DICOM file-set) or FSC (for not-initialized media) when requested to write Reports to the local archive medium (only CD-R supported).
In case of new media (media not initialized) it will create a DICOMDIR file on the medium or otherwise (already existing DICOM file-set on medium) it will update the existing DICOMDIR file when writing the new Report SOP Instances to medium.
The ACOM.Report® application will not close the CD-R medium.

2.2.1.3 Application profiles

2.2.1.4 DICOMDIR keys

The DICOMDIR file will contain the following attributes for the levels Patient – Study – Series – Image for the new SOP instances written by ACOM.Report® application (valid for all Application profiles described in this chapter) :

DICOMDIR keys:

Attribute Name	Tag	Type	Notes
File-Set identification			
File-set ID	(0004,1130)	2	volume label of media
Directory information			
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	0000H
Directory Record Sequence	(0004,1220)	2	
> Offset of the Next Directory Record	(0004,1400)	1C	
> Record In-use flag	(0004,1410)	1C	FFFFH
> Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
> Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE
> Referenced File ID	(0004,1500)	1C	contains the filename on media for the Directory Record of Type IMAGE
> Referenced SOP Class UID in File	(0004,1510)	1C	for the Directory Record of Type IMAGE
> Referenced SOP Instance UID in File	(0004,1511)	1C	for the Directory Record of Type IMAGE
> Referenced Transfer Syntax UID in File	(0004,1512)	1C	for the Directory Record of Type IMAGE
> Record Selection Keys	see below		
Patient Keys			**Directory Record Type PATIENT**
Specific Character Set	(0008,0005)	1C	See section 2.5 on page 10
Patient's Name	(0010,0010)	2	
Patient ID	(0010,0020)	1	
Date Of Birth	(0010,0030)	3	Type 2 in STD-XA* profiles
Patient's Sex	(0010,0040)	3	Type 2 in STD-XA* profiles
Study Keys			**Directory Record Type STUDY**
Specific Character Set	(0008,0005)	1C	See section 2.5 on page 10

Study Date	(0008,0020)	1	
Study Time	(0008,0030)	1	
Accession Number	(0008,0050)	2	
Study Description	(0008,1030)	2	
Study Instance UID	(0020,000D)	1C	
Study ID	(0020,0010)	1	
Series Keys			**Directory Record Type SERIES**
Specific Character Set	(0008,0005)	1C	See section 2.5 on page 10
Series Date	(0008,0021)	3	
Series Time	(0008,0031)	3	
Modality	(0008,0060)	1	
Institution name	(0008,0080)	3	Type 2 in STD-XA* profiles
Institution Address	(0008,0081)	3	Type 2 in STD-XA* profiles
Series Description	(0008,103E)	3	
Performing Physician	(0008,1050)	3	Type 2 in STD-XA* profiles
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
Image Keys			**Directory Record Type IMAGE**
Specific Character Set	(0008,0005)	1C	See section 2.5 on page 10
Image Type	(0008,0008)	3	identification characteristics Type 1 in STD-XA* profiles
SOP Class UID	(0008,0016)	3	
SOP Instance UID	(0008,0018)	3	
Image Date	(0008,0023)	3	
Image Time	(0008,0033)	3	
Image Number	(0020,0013)	1	
Rows	(0028,0010)	3	
Columns	(0028,0011)	3	
Calibration Image	(0050,0004)	3	Empty field (Type 2 in STD-XA* profiles, for XA IOD)
Icon Image Sequence	(0088,0200)	3	required for XA Application profiles, optional for the others
> Samples per Pixel	(0028,0002)		1
> Photometric Interpretation	(0028,0004)		MONOCHROME2
> Rows	(0028,0010)		128
> Columns	(0028,0011)		128
> Bits Allocated	(0028,0100)		8
> Bits Stored	(0028,0101)		8

> High Bit	(0028,0102)		7
> Pixel Representation	(0028,0103)		0 (unsigned)
> Pixel Data	(7FE0,0010)		Icon Image pixel data

2.2.1.5 STD-GEN-CD

For media conforming to the STD-GEN-CD Profile the following SOP classes will be supported as an FSR, FSC,FSU

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Standalone IODs (Standalone Overlay, Standalone Curve, ..) are not supported by either FSR/FSC/FSU.

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

The details of the written XA SOP Instances are described in Annex A.

2.2.2 Augmented and Private Profiles

2.2.2.1 Augmented Application Profiles

When updating a Cardio-CD with an already existing file-set then the STD-XABC and STD-XA1K application profiles will be extended to store XA SOP Instances also in uncompressed transfer syntax (and different image matrix format than specified in STD-XABC-CD):

2.2.2.2 AUG-XABC-CD, AUG-XA1K-CD

For media conforming to the AUG-XABC-CD or AUG-XA1K-CD Profile the following SOP classes will be supported as an FSR, FSC,FSU:

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

The Image matrix format (Rows, Columns) may be any non-square format smaller than or equal 1024x1024. For details see Annex A.

2.3 Extensions, Specializations and Privatizations of SOP Classes and Transfer Syntaxes

2.3.1 Standard Extensions of all SOP classes

The following table lists the extensions for all DICOM IOD attributes where the DICOM definitions are extended:

Attribute Name	Tag	Type	Notes
Image Type	(0008,0008)	1	Additional Defined Terms: Defined Terms for value 4: “QCA” “LVA” “LVA BIPLANE” “CURVE” “HEMO”

The first 3 values for the Image type are always
“ DERIVED\PRIMARY\SINGLE PLANE"

2.4 Configuration

2.4.1 AE Title Mapping

The ACOM.Report® application provides the DICOM Application Entity Title:
“ACOM.Report”

2.5 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. supplementary set)

Annex A: Siemens ACOM.Report® XA IOD Description

Table A.1: XA IOD description for instances created by ACOM.Report® application:

Module	Attribute Name	TAG	Type	Comments
Patient	Patient's Name	0010,0010	2	
	Patient ID	0010,0020	2	
	Patient's Birth Date	0010,0030	2	
	Patient's Sex	0010,0040	2	
General Study	Study Instance UID	0020,000D	1	
	Study Date	0008,0020	2	
	Study Time	0008,0030	2	
	Referring Physician's Name	0008,0090	2	
	Study ID	0020,0010	2	
	Accession Number	0008,0050	2	
	Study Description	0008,1030	3	
General Series	Modality	0008,0060	1	"XA"
	Series Instance UID	0020,000E	1	
	Series Number	0020,0011	2	
	Series Date	0008,0021	3	
	Series Time	0008,0031	3	
	Performing Physician's Name	0008,1050	3	
General Equipment	Manufacturer	0008,0070	2	"SIEMENS "
	Institution Name	0008,0080	3	
	Institution Address	0008,0081	3	
	Manufacturer's Model Name	0008,1090	3	"ACOM_REPORT "
	Device Serial Number	0018,1000	3	
	Software Version	0018,1020	3	
General Image	Image Number	0020,0013	2	> 256
	Patient Orientation	0020,0020	2C	Empty field
	Image Date	0008,0023	2C	
	Image Time	0008,0033	2C	
	Lossy Image Compression	0028,2110	1C	"00" for QuantCor LVA, LVA biplane reports "01" for CathCor Hemo, Curve and QuantCor QCA reports
Image Pixel	Samples per Pixel	0028,0002	1	1
	Photometric Interpretation	0028,0004	1	"MONOCHROME2"
	Rows	0028,0010	1	See Note below
	Columns	0028,0011	1	See Note below
	Bits Allocated	0028,0100	1	8
	Bits Stored	0028,0101	1	8
	High Bit	0028,0102	1	7
	Pixel Representation	0028,0103	1	0000H (unsigned)
	Pixel Data	7FE0, 0010	1	
Cine	Frame Time	0018,1063	1C	"1000" (1sec per frame)
	Recommended Display Frame Rate	0008,2144	3	"1"
Multi-Frame	Number of Frames	0028,0008	1	
	Frame Increment Pointer	0028,0009	1C	00181063H
Frame Pointers	Representative Frame Number	0028,6010	3	"1"
X-Ray Image	Image Type	0008,0008	1	DERIVED\PRIMARY\SINGLE PLANE\... (see section 2.3.1 on page 10)
	Pixel Intensity Relationship	0028,1040	1	"LIN "
X-Ray Acquisition	KVP	0018,0060	2	Empty field
	Radiation Setting	0018,1155	1	"GR"
	Exposure Time	0018,1150	2C	Empty field
	X-Ray Tube Current	0018,1151	2C	Empty field
XA Positioner	Positioner Motion	0018,1500	2C	"STATIC"
	Positioner Primary Angle	0018,1510	2	Empty field
	Positioner Secondary Angle	0018,1511	2	Empty field
VOI LUT	Window Center	0028,1050	3	0..255
	Window Width	0028,1051	1C	1..254
SOP Common	SOP Class UID	0008,0016	1	XA IOD
	SOP Instance UID	0008,0018	1	
	Specific Character Set	0008,0005	1C	"ISO_IR 100"
	Instance Creation Date	0008,0012	3	
	Instance Creation Time	0008,0013	3	
	Instance Creator UID	0008,0014	3	

Note: The resulting image matrix size depends on the Image Type:

Report Type	Image Type Value 4	Columns	Rows	Comments
QuantCor QCA	QCA	612	866	Subsampled from original format → Lossy Compression flag 0028,2110 is set to “01”
QuantCor LVA	LVA	430	655	Original size
QuantCor LVA biplane	LVA BIPLANE	430	655	Original size
Cathcor Curve	CURVE	806	570	Subsampled from original PCL file → Lossy Compression flag 0028,2110 is set to “01”
CathCor Hemo Report	HEMO	612	790	Subsampled from original PCL file → Lossy Compression flag 0028,2110 is set to “01”